

CREATING STRATEGIC COMPETENCE OF INDEPENDENT
SMALLHOLDERS FOR SUSTAINABLE PALM OIL*Mewujudkan Kompetensi Strategis Petani Swadaya untuk Kelapa Sawit Berkelanjutan*

Nurliza

Agribusiness Department, Agriculture Faculty, Universitas Tanjungpura, Pontianak 78124, Indonesia

^{*)}E-mail: nurliza.spm@gmail.com

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ABSTRACT

This research was conducted in the frontier districts through in-depth interviews with 120 independent smallholders structured based on the Indonesian Sustainable Palm Oil (ISPO), which include legal aspects, environmental management and monitoring, farmers organization and farm management aspects so that the strategic competence can be translated using both river diagram and stairs diagram. The results indicated that the targets of competency performance initiatives related to legality and environmental management aspects as well as supervision aspects are to learn and receive knowledge practices gradually in all groups of farmers, including knowledge of fire precaution and control and improvement of sustainable businesses. Furthermore, the target of competency performance initiatives related to aspects of fire precaution and control and biodiversity is to receive knowledge transfer. However, regions that have higher competencies or lower competency gaps can be providers of knowledge recipients by considering the technology adoption and appropriate motivation methods. Therefore, in order to overcome farmers' low knowledge and competencies or the high gap between knowledge and competence, there needs to be an approach of capturing knowledge by ensuring that all farmers can learn and are able to access services and innovations; and also an approach of sharing knowledge through education and training programs, proper cultivation practices, certification, and partnerships with universities, companies, governments and communities.

Keywords: Independent Smallholders, River Diagram, Stairs Diagram, Strategic Competence, Sustainability

ABSTRAK

Penelitian dilakukan di kabupaten perbatasan melalui wawancara mendalam terhadap 120 petani swadaya dalam kerangka Minyak Kelapa Sawit Berkelanjutan Indonesia (Indonesian Sustainable Palm Oil/ISPO), mencakup aspek hukum, pengelolaan dan pemantauan lingkungan, organisasi petani dan aspek manajemen untuk mewujudkan kompetensi strategis menggunakan diagram sungai dan diagram tangga. Hasil penelitian menunjukkan bahwa target inisiatif kinerja kompetensi terkait aspek legalitas dan manajemen lingkungan serta aspek pengawasan adalah mempelajari dan menerima praktik pengetahuan secara bertahap dalam semua kelompok petani, termasuk pengetahuan terkait tindakan pencegahan dan pengendalian kebakaran dan peningkatan bisnis secara berkelanjutan. Selain itu, target inisiatif kinerja kompetensi terkait aspek pencegahan dan pengendalian kebakaran dan keanekaragaman hayati adalah menerima transfer pengetahuan. Namun, daerah yang memiliki kompetensi lebih tinggi atau kesenjangan kompetensi yang lebih rendah dapat menjadi penyedia penerima pengetahuan dengan mempertimbangkan adopsi teknologi dan metode motivasi yang sesuai. Oleh karena itu, upaya mengatasi pengetahuan dan kompetensi petani rendah atau kesenjangan yang tinggi antara pengetahuan dan kompetensi dilakukan dengan pendekatan menangkap pengetahuan dengan cara memastikan bahwa semua petani belajar dan dapat mengakses layanan dan inovasi; dan pendekatan berbagi pengetahuan melalui program pendidikan dan pelatihan, praktik budidaya yang tepat, sertifikasi, dan kemitraan dengan universitas, perusahaan, pemerintah dan masyarakat.

Kata kunci: Diagram Sungai, Diagram Tangga, Keberlanjutan, Kompetensi Strategis, Petani Swadaya

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INTRODUCTION

Palm oil is a crucial commodity for feeding the growing world population as a result of being the best vegetable oil in the world. Palm oil, the liquid from palm oil, is mostly used by households (e.g. cooking oils) and the world industries (e.g. personal care and cosmetics, retail food and snack manufacturers, biofuel and energy, animal feed, pharmaceutical, and food service/industry service). Furthermore, palm oil attracts farmers as it generates wealth and sustainable improvement, as well as employment for local communities. Around 16 million of indirect jobs were available in this sector. The land-use profitability analysis also showed higher returns and higher competitiveness than rubber; it is far more feasible and more economic than rice production (Feintrenie *et al.* 2010).

However, there was a debate on the palm oil sector, which had a negative impact, i.e. land alienation, social and politic conflicts, labor exploitation, degraded land, water pollution and damage of biodiversity (Feintrenie *et al.* 2010), which become a public issue for the government, parliaments and citizens in many countries, particularly to guarantee the standards for sustainable production. Thus, the WTO's Trade and Environment Committee has been committed to ensuring production systems with appropriate standards to strengthen the environmental and farmers' will use these standards scheme framework for catching world market for the palm oil's future and its sustainability.

Therefore, Indonesia as the world palm oil producer launched Indonesia's Sustainable Palm Oil System or ISPO in 2011 as the mandatory certification scheme. Furthermore, the Ministry of Agriculture, with UNDP support, has taken the lead to analyze major differences between ISPO and RSPO to align the principles and criteria of ISPO, to strengthen its legal standing in the sustainability dimensions and public policy involvement, and to counter the risk that probably arises. However, an appropriate standard alone is not the answer, and all the initiatives undertaken need a platform to discuss due to the complex and interconnected issues along the value chain by enhancing coordination and building consensus.

In parallel, it is also importunate to support independent smallholders who already manage more than 40 percent of all palm plantations in Indonesia, which face a tough challenge due to the following aspects underlined in the RSPO (2016) and the Agriculture Ministry for palm oil license (No.98/Permentan/OT.140/9/2013). Independent smallholder's common characteristics are self-organized, self-managed, self-financed, and no formal sustainability requirements, which caused ineligible for ISPO standard. Meanwhile, sustainable palm oil industry required the organized farmers groups to receive a training and access to strategic agricultural resources for the certification. Besides, they also varied greatly and had lower productivity than plasma farmers.

Recently, emerging sustainability research has tried to explore the learning outcomes and competency development for farmers as change agents through active participation modeling and transforming society towards sustainable practices to help in bridging the gap between performance and opportunity. It also hopes to help farmers use ISPO standards voluntarily by linking traditional business to products and future service to obtain more opportunities across the market and the products as a long term competitive advantage. The farmers ought to specialize in outsourcing all non-core activities to improve the operations and encourage learning setting appropriate for their competencies. The important aspect of the competencies will provide a framework for identifying farmers' strengths and strategies accordingly.

Thus, this research tried to translate the strategic competence of independent smallholders' ability through gaps identification between knowledge and competence in ISPO framework for controlling their work and nurturing an acceptable response level of the confront contingencies. However, the challenge is how to identify, hold onto, share, and evolve the accurate and reliable critical gaps between knowledge and competency for emerging the competitive advantage and avoid the redundancies or scarcity of the competencies.

METHODS

It was necessary to identify the characteristics of the respondent for providing an overview that formed the results of the strategic competence analysis and their effect on competences (Islam. *et al.* 2013; Kuipers *et al.* 2014; Montedo & Abrahão, 2015; Vik & Stræte, 2017). The respondents'

characteristics also provided effective adoption and transfer of technical knowledge (Euler *et al.*, 2015). Therefore, the results confirmed that (1) the majority of the independent smallholders were 17-55 years old; (2) the average education level of household heads was elementary school; (3) their land tenure was from 2 to 4 hectares; (4) the number of family members was 4-5 person; (5) the farm experience was 7-9 years; (6) the number of palm oil trees was less than 200; (7) the age of the palm oil farm was 4-5 years; and (7) their monthly yield was less than 2 tons/ha. These can be seen in Table 1.

Table 1. The characteristics of respondents

Characteristics	Percentage (%)
Age (years):	
< 17	0
17-55	71.7
>55	28.3
Education of household head:	
Illiterate	14.2
Elementary school	32.5
Junior high school	27.5
Senior high school	15.8
College	10.0
Land tenure (hectares):	
≤ 2	70.0
>2-4	20.8
>4-6	4.2
>6-8	2.5
>8	2.5
Family members (persons):	
1-3	31.7
4-5	61.7
6-7	6.6
Farm experiences (years):	
4-6	21.7
7-9	67.5
10-12	10.0
13-15	0.8
Number of trees:	
≤ 200	49.2
>200-400	28.3
>400-600	14.2
>600-800	3.3
>800	5.0
Age of palm oil (years):	
8-9	4.2
6-7	36.7
4-5	59.1
Monthly yields (tons/ha):	
<2	60.8
2-4	29.2
>4-6	5.0
>6-8	3.3
>8	1.7

In Table 1, considering their average age, the independent smallholders were in their productive level, but their education was low. Thus, it is difficult to access the information for adjusting the management requirement in order that the adoption of plant management rates remain

less to moderate. Meanwhile, the farming experience is a proxy for the age of farmers reflecting the successful compliance of new plantation crop (Euler *et al.*, 2015). With regard to land tenure, the majority of farmers had over two ha and less than four ha due to land claim history (Krishna *et al.*, 2014). Most of them managed and monitored their farm as a path-dependency (Jelsma *et al.*, 2017). Palm oil keeps spreading over forests and displacing rubber plantations and Siam orange which are common commodities in Sambas or frontier area due to significantly high financial return income parallel with the farm sizes. Afterwards, the expansion of palm oil production grew at a slower rate due to the absorption capacity boundary of existing processing plants and free land resources scarcity. The land conversion to palm oil seems unfavorable to everyone (Euler *et al.*, 2015). Moreover, the Land Agency in Sambas regency only issued a land ownership certificate (SHM) by owning land ownership letter (Surat Keterangan Tanah/SKT) from their head of village (lurah). Still, there are some farmers reported of being reluctant to obtain land ownership certificate due to some concerns about tax of land ownership certificate, and limited funds for processing fee, unless there are some benefits of having it (INOBU, 2016).

Regarding the family members, the majority of palm oil households had 4-5 persons, which serve as workforce to support families and minimize labor cost due to higher costs or capital and input-intensive. The switching of labor from rubber to palm oil due to land conversion to palm oil from rubber which is less labor-intensive can be used to increase off-farm incomes (Euler *et al.*, 2017). Furthermore, the number of palm oil trees, the age of palm oil plant, and the yield illustrated that the productivity of independent smallholders is far below but has larger variation than plasma farmers and private plantation (Daemeter-Consulting, 2015) caused by insufficiency of farm management knowledge and short of financial capital, i.e. uncertified seed, incorrect planting distance, pruning, weed control, pest management, and proper fertilizers (Euler *et al.*, 2016). Hence, the results of competency assessment in legal and environmental management and monitoring aspects are used for identifying the strengths and weakness as an integrated strategic approach, to create a strategy of sharing knowledge within an organization using the stair diagram presented in Figure 1 and Figure 2.

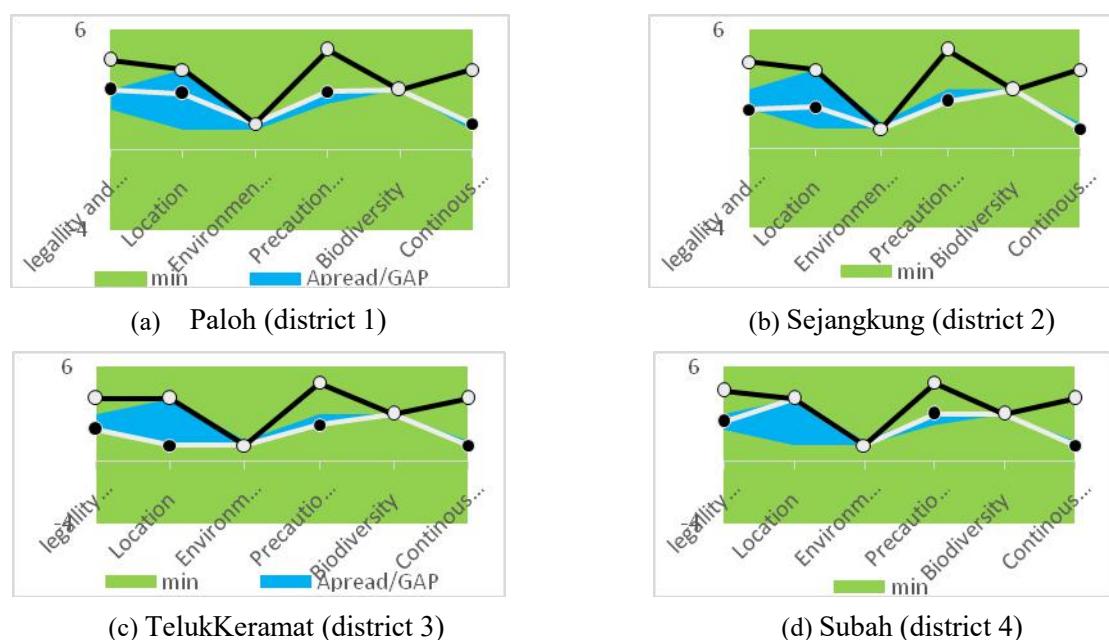


Figure 1. River diagram assessment of legal and environmental management & monitoring aspects

In Figure 1, the assessment of legal and environmental management and monitoring aspects in some districts proved that the competences were above average, i.e. legal and management (district 1); location (district 4); the precaution and control of fire (district 1 and 4); biodiversity (district 1). Regarding the legal and management, the competence was supported by the role of farmer's organization for serving their members in making input and output markets (Shiferaw *et al.*, 2009;

Barham & Chitemi, 2009; UNSDSN, 2013). The farmer organizations could be directly linked to the markets with non-governmental organizations support (Hellin *et al.*, 2007) to achieve sustainable development goals (Kumar *et al.*, 2015; Nurliza & Dolorosa, 2017), poverty reduction and rural development (Penunia, 2011; FAO, 2012), and the value chain integration (Francesconi & Wouterse, 2015).

The changes in location knowledge can be attributed to achieving self-sufficient farming (Tripp & Longley, 2006), and the palm oil processing locations that are close to farmers' land with the suffice road of access have a potential effect on reducing the reliance upon the cost of distance and pursuing a profitable livelihood option (Cramb & Sujang, 2012; Cazzola *et al.*, 2013). Meanwhile, palm oil on peat lands had an impact on the peat's ecosystem and financial due to the characteristics of fire-prone peat lands (Varkkey, 2015; Veloo *et al.*, 2015) which need related expertise of planning and best management practice (Goldstein, 2016).

Still, most farmers plant some catch and green crops cover (Pe'er *et al.*, 2016) for farming practices which are often misperceived as farmland biodiversity or the ecological protection. However, most of the references proved that the ecological factors are needed as key factors in the policy environment for the biodiversity (Yves *et al.*, 2017). Moreover, most land in palm oil research areas is land conversion from several different land use types, such as rubber, Siam orange and rice fields, leading to indirect land use change effects (Saswattecha *et al.*, 2016). It is also exacerbated by current moratorium conversion of production forests which resulted in biodiversity threat and increased greenhouse gas emissions, even though there are some tax and policies for protecting the conservation areas (Vijay *et al.*, 2016). The adoption of majority independent smallholders in legal and environmental management and monitoring aspects was illustrated in Figure 2.

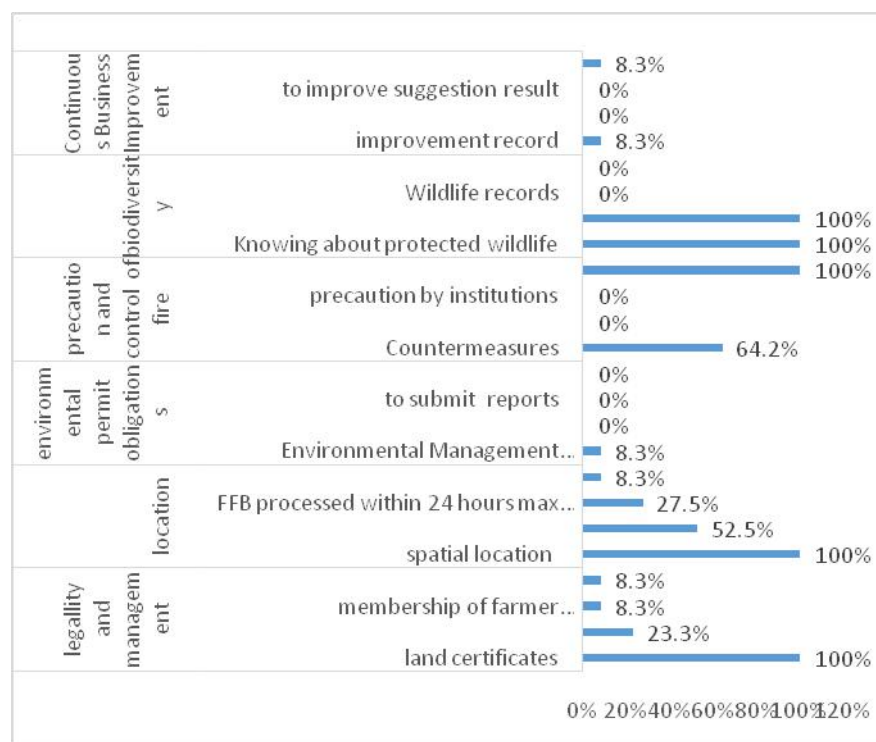


Figure 2 The adoption frequency in legal and environmental management and monitoring aspects

In Figure 2, the adoption frequency of legality and environmental management aspects as well as supervision aspects is low, due to the following aspects. First, there was no record of continuous business improvement due to no modular training by agricultural consulting services (Wordofa & Sassi, 2014), constraints along the value chain market (Baloyi, 2010), extension programs with commercial interests, limited risk management and investment (IDH, 2017). Second, farmers had limited information and proper cultivation practices, and there was no record of the implemented sustainable business improvement results. Second, records of fire precaution and control are low due to limited

access, understanding and credibility of information in context-specific decision making (Nesheimet.al. 2017), as well as an unbalanced proportion between commitments and obligations within the ISPO framework. Therefore, the local governments must be able to maintain and enhance policies that expand access to certain public services by supporting access to basic needs and other supporting factors. A multi-year strategy for implementing various obligations and bound rights is needed to gain the benefits of ISPO compliance (Joseph, 2013). Third, there were no environmental management records due to lack of awareness, low effectiveness and transparency, and low technological innovation (OECD, 2005), such as the confusing proliferation of laws, difficulties in compliance, no modern management information and technical solutions, limited technical skills, and financial resources in management and technology solutions, as well as skeptical perspectives on profit potential, cost savings, and client rewards in environmental improvements (OECD, 2007; Munthali & Murayama, 2013). Fourth, there were records of institutional activities due to farmers' heterogeneity and lack of linkages between commercial agriculture, production and marketing, which causes uncoordinated decision making; depository practices that are not in line with commercial approaches; limitations in managing and understanding quality; and sales to intermediaries (middlemen), fund deviations and personal profit motivations (Woolverton & Neven, 2014).

On the other hand, farmers' competence in legal and management aspects related to land certificates is higher due to the positive effect of registration and certification of rural agricultural household land (Taddese, 2013). Therefore, the institutional function of farmers in the future should become a center for knowledge transfer by improving the structure and eliminating the institutional costs. Fifth, there were no records of wild plants and animals (biodiversity) due to differences between farmers' perceptions of damage and compensation objectively and rationally from conservation policies. Thus, a visual damage assessment technique is needed by the government to pay compensation to farmers (Bayaniet.al. 2016). However, competence related to spatial location to support biodiversity is proven to be higher than other aspects so it requires a comprehensive approach through a participatory process of area design to understand ecosystem services. Mapping, calculation, and graphics as communication tools are used to design possible implications for the loss of biodiversity in the future (Rojoet.al. 2014). In legal and management section, the smallholders' competence of land certificates is also found to be higher due to positive and significant effect on the registration and certification of land in rural farm households to engage in the planting (Taddese, 2013). The results of competence assessment in farmers' organization and farm management aspects were presented in Figure 3 and Figure 4.

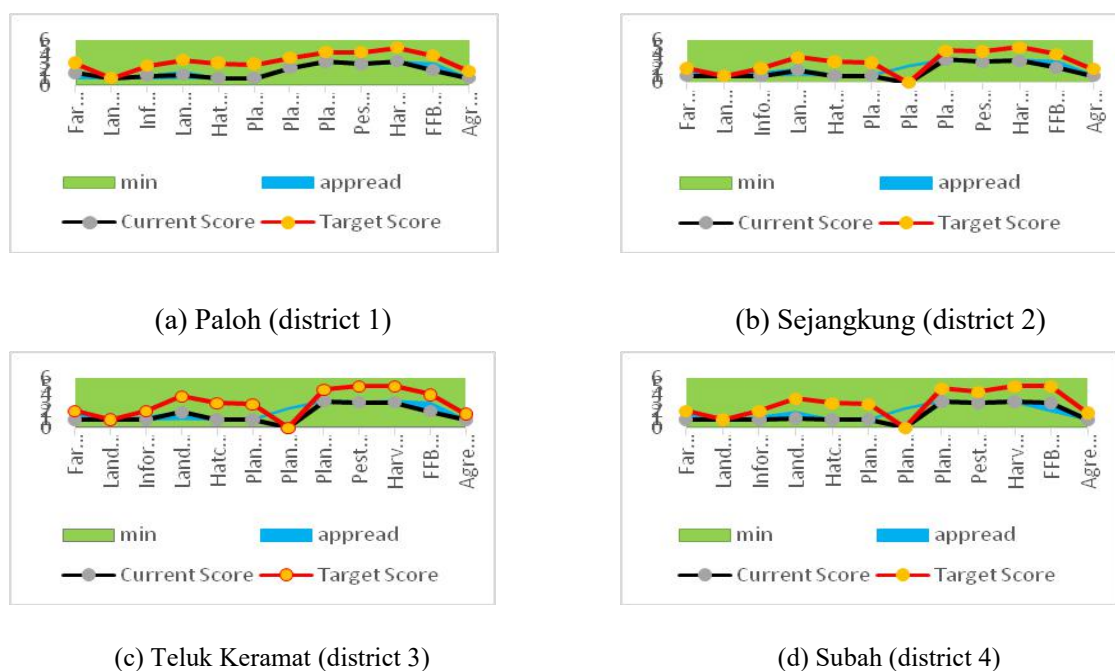


Figure 3. River diagram for assessing farmers' organization and farm management aspects

In Figure 3, the majority of districts had low competence except the following: i.e. the plant cultivation (district 1 and district 2) which is the key to the sustainability of the platform of palm oil production to conserve high value of forests and wild life (Basiron, 2007), harvesting (district 1 and district 2) and FFB transportation (district 4) regarding the quality of fresh fruit bunches (FFB) (Mat Sharif *et al.*, 2017), and the efficiency of work and financing (Salmiyati *et al.*, 2014) as presented in Figure 4.

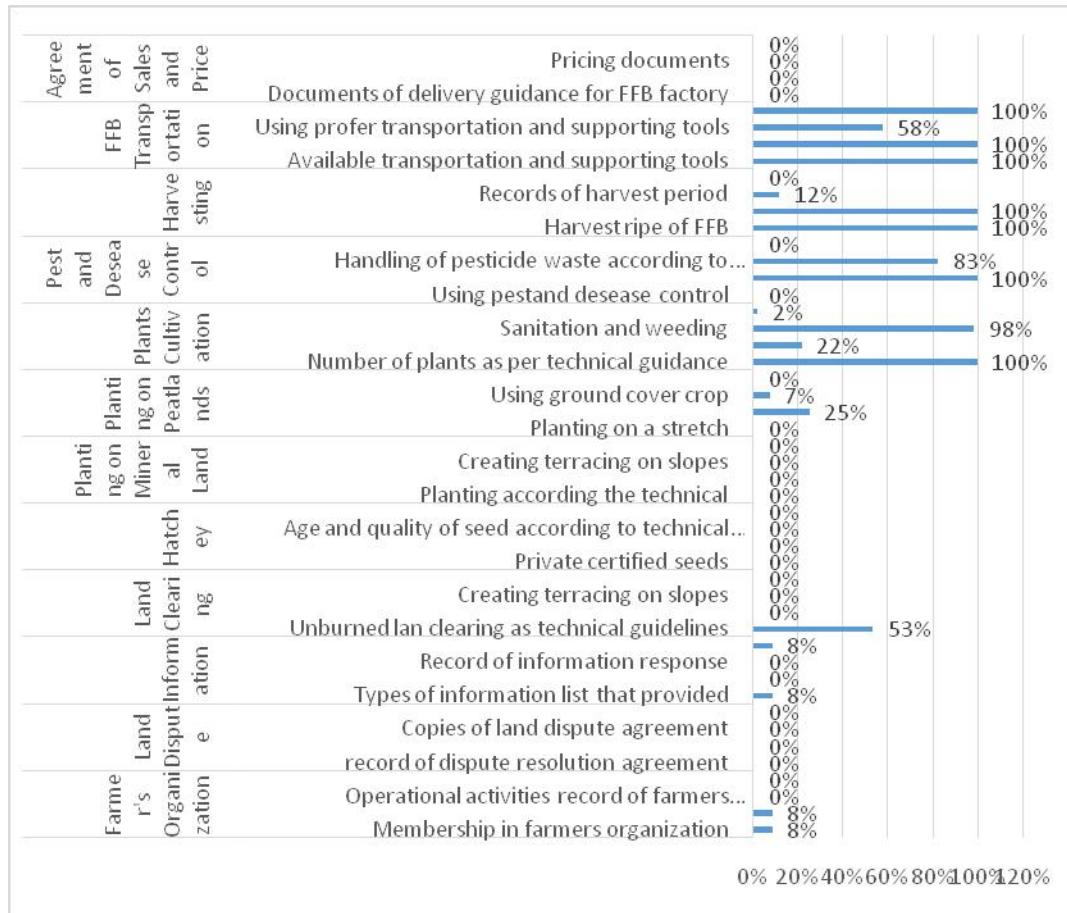


Figure 4. The adoption frequency in farmers' organization and farm management aspects

In Figure 4, most adoption frequency in farmer organizations and farm management aspects was very low and even there was no adoption, mainly related to several aspects: (1) Harvesting (harvest period records); (2) Plant cultivation (records of crop cultivation, maintenance of terraces and drainage, etc.); (3) Planting on peat lands (use of ground cover, number and spacing according to instructions); (4) Information (information and types of information provided); (5) Farmer Institution (records of establishment and membership) as a significant problem for policy formulation and the program planning, and monitoring and evaluation (Tham-Agyekum *et al.*, 2010). Therefore, the co-training with economic incentives to increase awareness of their benefits under certain conducive terms might be able to deliver competitive and effective cost and tools for desired goals (Hong Yun & Lian Ge, 2009).

The independent smallholders also remains unclear about ISPO due to the vague status of the certification process (van der Enden, 2013), which leads to a different path of policy arrangements and reshaped power relations for each of the villages. The policy makers should consider the dynamics in the given context and site awareness amongst the frontier smallholders about the farm management in ISPO principles and criteria which seems to be very limited. Several smallholders acknowledged that a higher price of FFB involved the compliment of ISPO certification, which is certainly no guarantee. Farmers' organization and farm management aspects assessment also proved that there is still very low adoption or low competence regarding the harvesting section (i.e. records of

harvest period); plant cultivation section (i.e. records of plant cultivation, terracing maintenance and drainage, etc.); planting on peat lands (i.e. using ground cover crop, set number and spacing as per instructions); information section (i.e. information and type of information list that is provided); and farmers organization section (i.e. establishment record of and membership). Otherwise, the highest competencies would be long affordable between the estate and processing plant, record of total transportation, available transportation and supporting tools in the FFB transportation section; preparation of manpower, equipment and tools, ripe of FFB harvest in harvesting section; listed pesticides in the pest and disease control section; and number of plants as per technical guidance in plants cultivation section.

However, there are some major competences, i.e. using proper transportation and supporting tools in the FFB transportation section; handling waste pesticides according to technical guidance in the pest and disease control section; sanitation and weeding in the plant cultivation section; and unburned land clearing as technical guidance in land clearing section. This is a potential impact of palm oil cultivation on peat lands, such as subsidence of soil, flooding, pollution of water and water, biodiversity change and socioeconomic (Huan *et al.*, 2012). Besides, there are some characteristics of palm oil farming in peat lands areas by independent smallholders, i.e. comparatively high costs due to additional land preparation and water management or physical and production infrastructure; comparatively high risks due to access to production inputs and fire and pests control, low productivity (Gaveau *et al.*, 2014; Lim *et al.*, 2012; Woittiez *et al.*, 2017), and off-farm economic opportunities and public services which are less than established agricultural area. However, the land prices tend to be considerably lower, making it attractive for land speculation.

Therefore, the empirical findings generally reveal that the low competencies caused innovative technology usage barriers to those services because of the following reasons, i.e. lack of the existence of such technologies or lack of information access among farmers (Odongo, 2014); erratic and poor service delivery (Wild *et al.*, 2012; Obert *et al.*, 2015); inadequacy of the provided services (Odini, 2014); inadequate number of extension officers (Baloch & Thapa, 2019); low service, motivation, and sense of responsibility among extension agents, also weak monitoring system (Jan *et al.*, 2008); and lack of access to finance (Wulandari *et al.*, 2017). Furthermore, the result of competence assessment in legal and environmental management and monitoring aspects as a strategic tool can be used to promote community groups for providing ideas of potential competences, which can be shared gradually using stair diagrams as presented in Figure 5 and Figure 6.

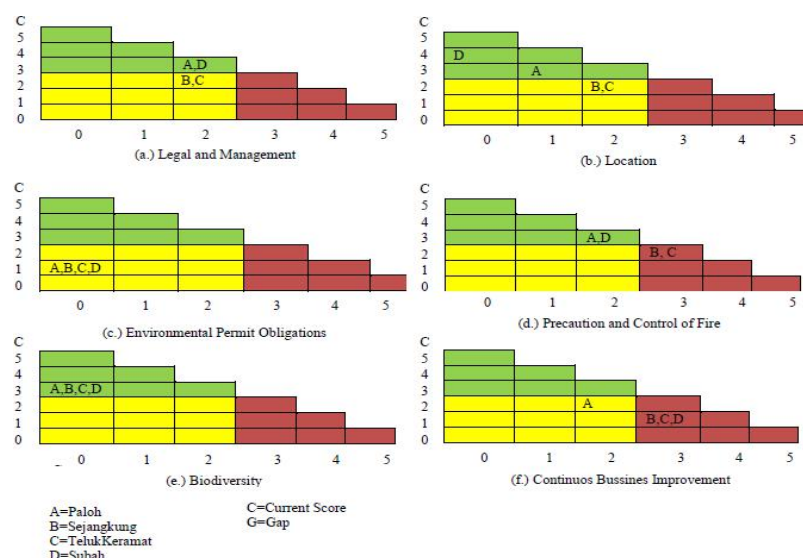


Figure 5. Stair diagram for assessing legal and environmental management & monitoring aspects

In Figure 5, farmer groups are in the lower right side. They are those who have low competencies at the current score but are considered as a group with a great opportunity to learn and receive knowledge, especially in the precaution and control of fire aspects (district 2 and district 3)

and continuous business improvement aspects(all of district). On the other hand, farmer groups in the upper left are those who have higher competencies at the current score, or the target difference to be achieved is low, so that the group has higher knowledge and competence than others, especially in legal and management aspects (district 1 and district 4); location (district 1 and district 4); precaution and control of fire (district 1 and district 4); and biodiversity (all districts). Then, the yellow groups are farmer groups who have less competence, so that they can only become groups of recipients of knowledge and skills for all aspects, except for precaution and control of fire, and also biodiversity.

Thus, the target competence performance initiative of legal and environmental management and monitoring aspects for learning and receiving the best knowledge practice gradually in the whole group are the precaution and control of fire and continuous business improvement aspects. Furthermore, the target competence initiative performance for sharing of the best knowledge practice gradually in the whole groups are legal and management aspects, and also the location aspect. On the other hand, the target competence initiative performance for practicing in the whole group as recipients in transfer knowledge are the precaution and control of fire, and biodiversity aspect. However, district 1 and district 4 had higher competence at the current score or lower gaps of competence and can be transformed into a provider of recipient of knowledge depending on the technology adoption methods and the motivation.

In Figure 6, farmer groups in the lower right are those who have low competencies at the current score, but are considered as a group with a great opportunity to learn and receive knowledge, especially in the land clearing aspect (all districts); hatchery (all districts); planting on mineral land (all districts); plant cultivation (district 4); pest and disease control (district 1, district 2 and district 3); harvesting (all districts); and FFB transportation (all districts). The farmer groups in the upper left are those who have higher competencies at the current score, or the target difference to be achieved is low, so that the group has higher knowledge and competence than others. However, there are no areas with those competencies. The yellow areas are the farmer groups who have less competence, so that they can only be recipients of knowledge and skills, particularly in farmers organization and farm management aspects for all districts, except for land clearing, hatchery, planting on land mineral, harvesting, and FFB transportation.

Thus, the target competence initiative performance of farmers' organization and farm management aspects for learning and receiving the best practice knowledge gradually in the whole group is the aspect of land clearing (all districts); hatchery (all districts); planting on mineral land (all districts); plant cultivation (district 4); pest and disease control (district 1, district 2 and district 3); harvesting (all districts); and FFB transportation (all districts). Meanwhile, the target competence of initiative performance in transferring the best knowledge practices is all aspects of farmer organizations and farm management for the whole groups, except for the aspects of land clearing, hatchery, planting on land mineral, harvesting and FFB transportation.

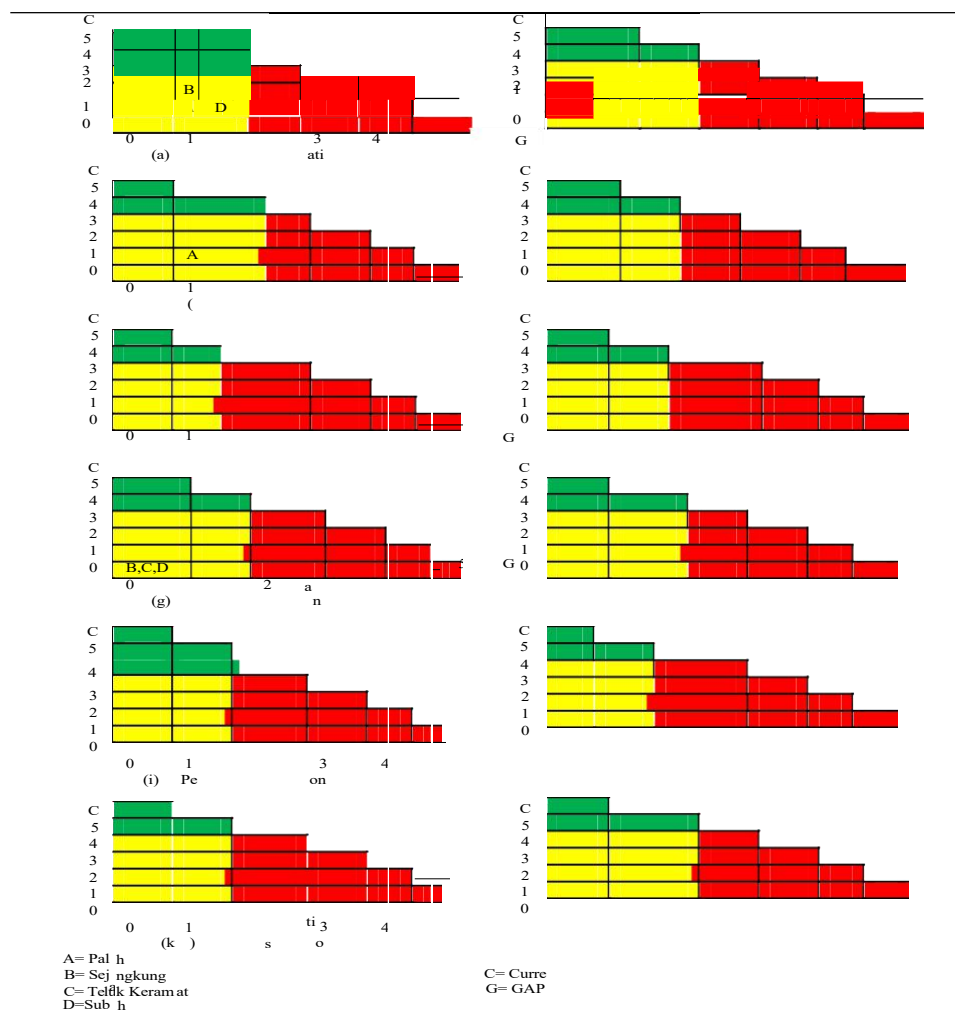


Figure 6. Stair diagram for assessing farmers' organization and farm management aspects

There has been a demand for effective linkages among the extension centers and stakeholders in problem-solving and decision-making processes, and disseminating knowledge, skills, and information (Glendenning et al., 2010; Kahan, 2013) to address the specific location constraints and significant positive roles of speed adoption in the palm oil export price as market incentives (Wheeler et al., 2013; Euler et al., 2015; Shepherd, 2007; Baloch & Thapa, 2016) by adapting to climate change (Anwar, et al., 2013). Therefore, there are two highlights for those problem results, i.e. knowledge capture and knowledge sharing to ensure the delivery of outstanding service and innovation for all smallholders to access insights and learning of the competence and knowledge. In knowledge capture, it can be achieved through digital boost for supporting materials, including online library of manuals and tutorial videos. The platform allows for benchmarking data so that they can always improve their practices and achieve sustainability certification for their crops. Knowledge sharing is achieved through fields of smallholders' projects and creating education hubs, providing training programs and good practices, ISPO training and certification, creating relationships with mills and farmer groups, and partnership with local schools, universities, and local NGOs for palm oil future sustainability industries.

CONCLUSIONS

The assessment of legal and environmental management and monitoring aspects prove that the competence and adoption frequency are above average, but there is a lack of adoption in legal and environmental management, and monitoring aspects. Farmers' organizations and farm management aspects assessment also proved that the adoption or competence is still very low. However, there are some major competencies, i.e. using proper transportation and supporting tools in the FFB transportation section; handling waste pesticides according to technical guidance in the pest and disease control section; sanitation and weeding in the plant cultivation section; and unburned land clearing as technical guidance in land clearing section. Thus, the target competence performance initiative of legal and environmental management and monitoring aspects for learning and receiving best knowledge practice gradually in the whole group are the precaution and control of fire and continuous business improvement aspects. The target competence initiative performance for sharing the best knowledge practice gradually in the whole groups is legal and management aspects, and also the location aspect.

Meanwhile, the target competence initiative performance for practicing in the whole group as recipients in transfer knowledge includes the precaution and control of fire, and also biodiversity aspect. Then, the target competence initiative performance of farmers' organization and farm management aspects for learning and receiving best knowledge practice gradually in the whole group is the aspect of land clearing; hatchery; planting on mineral land; plant cultivation for some districts; pest and disease control for some districts; harvesting; and FFB transportation. All aspects of farmer organizations and farm management are the target competence initiative performance in transferring the best knowledge practices gradually in the whole groups, except for the aspects of land clearing, hatchery, planting on land mineral, harvesting and FFB transportation in all districts. There are districts with higher competence at the current score or lower gaps of competence so that they can be transformed into a provider of recipient of knowledge depending on the technology adoption methods and the motivation. Therefore, there are two highlights for those problem results, i.e. knowledge capture and knowledge sharing to ensure the delivery of outstanding service and innovation for all the smallholders to access insights and learning of the competence and knowledge.

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